

## REMARKS

Claims 1-19 are pending.

Claims 1-19 are rejected.

Claims 1, 4, 5, 8, 9, 10, 11, 12 and 16 are amended.

### **35 USC 112, second paragraph**

Claims 1-19 are rejected under 35 USC 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

#### **Claim 1**

Claim 1 is amended to clarify the references in claims 5, 8, 9, 10, 11 and 14 to the low IV polymer and the high IV polymer.

In regard to high IV polymer, page 6, lines 6-7 makes clear that a high IV polymer is a cationic polymer of intrinsic viscosity of at least 4 dl/g. Both components (i) and (ii) of claim 1 encompass a high IV polymer of intrinsic viscosity of at least 4 dl/g.

In regard to the low IV polymer, Page 6, lines 13-15 makes clear that the cationic coagulant is a low IV natural, semi-natural or synthetic cationic polymer which exhibits intrinsic viscosity of below 4 dl/g and a cationic charge density of at least 3 meq/g. Component (iv) corresponds to this definition.

Thus the insertion of "high" and low into claim 1, adds no new matter.

Further applicants have deleted the phrase "assisted by a treatment system" which examiner believes is vague.

#### **Claim 4**

Claim 4 is amended to correct an obvious error by changing "(i)" to "(iv)", as it is (iv) which is defined as a cationic polymer of intrinsic viscosity of below 4 dl/g and a cationic charge density of at least 3 meq/g.

Furthermore, the term (ii) is replaced by "high IV polymer (component (i) or (ii)).

The phrase (components (i) or (ii)) is inserted to make clear what the high IV polymer is. See page 6, third paragraph where clearly the high IV polymer has an intrinsic viscosity of at least 4 dl/g. Both (i) and (ii) are cationic polymers of IV of at least 4 dl/g.

### **Claim 5**

Claim 5 is amended to clarify that the low IV polymer is component (iv). See page 6, third paragraph.

### **Claim 8 and 9**

The phrase "(components (i) or (ii))" is inserted to make clear what the high IV polymer is. See page 6, third paragraph where clearly the high IV polymer has an intrinsic viscosity of at least 4 dl/g. Both (i) and (ii) are cationic polymers of IV of at least 4 dl/g.

Support may also be found on page 7, line 24-25 and first paragraph of page 8 especially in regard to claim 9.

### **Claim 10**

Claim 10 originally used the term "coagulant".

Coagulant is defined in the disclosure as:

A low IV cationic polymer which exhibits intrinsic viscosity of below 4 dl/g and a cationic charge density of at least 3eq/g. See page 6, lines 13-14;

coagulants may also be any suitable inorganic coagulant. See page 7, lines 8-9; or

coagulants may be a charged microparticulate material. See claim 7.

Thus applicants have amended the claim 10 to specify that the coagulant is selected from (iv) low IV cationic polymer, inorganic coagulant and charged microparticulate material.

Claim 10 is further amended clarify the meaning of high IV polymer by inserting (component (i) or (ii)). See page 8, line 10 for support for adding both sequentially.

### **Claim 11**

Basis for amended claim 11 is the same as for claim 10. Basis of simultaneous addition may be found on page 8, line 15.

**Claim 12**

As (i) is not a low IV cationic polymer of intrinsic viscosity of below 4 dl/g and a cationic charge density of at least 3 meq/g, the component number is changed to (iv) to correct an obvious error.

The term (component (i) or (ii)) is also inserted as in claim 10.

**Claim 16**

Applicants have replaced step with 'stage" to correct antecedent basis.

No new matter has been added.

**35 USC 103(a)**

**Claims 1-3, 13, 17 and 19 are rejected under 35 USC 103(a) as being unpatentable over Brink, US 5,536,325 in view of Minowa.**

Examiner alleges that Brink (US 5,536,325) discloses a process for separating suspended solids from a fermentation liquor and that the liquor removed from the distillation stage would comprise water, lignin and BOD.

Applicants disagree:

Brink discloses a process wherein the hydrolysate obtained from lignocellulosic material has already been separated from insoluble biomaterial such as lignin, before said hydrolysate is neutralized and separated from contaminants resulted from neutralization and finally subjected to a fermentation stage.

The separation of insoluble biomass including lignin from the liquid hydrolysate is evident from col. 5, lines 58-62 and fig. 4, where the solids remaining after the second hydrolysis step are separated by centrifugation and subjected to wet oxidation. Likewise, another passage referring to fig. 1 describes that the slurry obtained in the stage II hydrolyser is subjected to several separators, and finally the solids, consisting primarily of lignin may be subjected to wet oxidation (cf. fig. 1, col. 4, lines 25-51). And also, col. 14, lines 36-38 confirm that the wet oxidation step serves to break down lignin. That is, the fermentation liquor does clearly not comprise lignin, contrary to the fermentation liquor of the present process.

Secondly, the solids-liquid separation stage referring to fig. 4 of Brink using ferric and aluminum salts as flocculants is carried out with a neutralized mixture, as mentioned above. Therefore, the flocculating agents are not applied to a fermentation liquor according to the present invention comprising water, lignin and BOD.

Finally, at the stage of fermentation there is neither a disclosure nor a suggestion how the solids-liquid separation of the fermentation liquor is carried out; it is only stated that the components such as yeast and CO<sub>2</sub> leave the system through different lines (cf. 6, lines 15-18). Also, the reference does not mention any use of a treatment system and least of all the specific treatment system as claimed in the present application.

Hence, any combination with Brink cannot lead to the claimed process.

Minowa et al. describes the use of one polymeric coagulant in dewatering of a fermentation stillage obtained from buckwheat or rice, wherein a cationic coagulant is effective for high water permeability and an anionic one is effective for fast sedimentation.

Minowa only discloses coagulants which are known to be low molecular weight polymers. Minowa does not teach or suggest the specific treatment system which comprises a cationic polymer having an intrinsic viscosity of at least 4 dl/g in combination with one or more coagulants defined as (iii) to (vi), as used in the present application (cf. claim 1). The instant separation process is particularly effective when the treatment system comprises a second component in addition to the cationic coagulant (cf. page 6, 2<sup>nd</sup> paragraph).

Therefore, it is not obvious to one skilled in the art to modify the process of Brink by applying a cationic polymeric coagulant, as disclosed by Minowa, to arrive at the instant invention. And even if a skilled person employed a cationic polymeric coagulant to a fermentation liquor obtained by Brink, one would obtain a process using specifically one coagulant to aid the separation step and wherein the fermentation liquor is already freed from lignin.

Hence, the present invention is not rendered obvious by Brink in combination with Minowa.

**Claims 4-6, 8-12 and 14-16 are rejected under 35 USC 103(a) as being unpatentable over Brink US 5,536,325 in view of Minowa and further in view of Hughes US 6,967,085.**

Hughes (US 6,967,085) is directed to a process of flocculating microbial cell material from suspending media, such as a fermentation broth, using a cationic polymer (low IV) and a non-ionic or cationic polymer (high IV) (col. 2, lines 47-56). As the fermentation broth is derived from purer carbohydrate substrates such as starch or corn meal (cf. col. 3, lines 32-40) and not from lignocellulosic materials, the fermentation liquor does therefore not contain any lignin material, contrary to the fermentation liquor of the present application which contains lignin. No hint is given to use the flocculating materials of Hughes for treating lignin containing fermentation liquors.

As discussed above, the process according to claim 1 is not rendered obvious by Brink alone or in combination with any other reference, especially combined with Minowa. Due to fermentation liquors free of lignin Hughes teaches away from applying the flocculating materials to a fermentation liquor obtained by Brink. And even if a skilled person used the flocculants of Hughes, one would not obtain in any case a process wherein the fermentation liquor comprises lignin.

Hence, the subject-matter of claims 4-6, 8-12 and 14-16 are not rendered obvious by Brink, Minowa and Hughes.

**Claim 7 is rejected under 35 USC 103(a) as being unpatentable over Brink US 5,536,325 in view of Minowa and further in view of Moffett US 6,132,625.**

Moffett (US 6,132,625) relates to a process of separating biosolids from an aqueous stream resulting from animal or vegetable processing operations using as flocculants an anionic inorganic colloid and a cationic polymer having a molecular weight greater than 1,000,000 (cf. claim 1). These polymers are comprised by the cationic low IV polymers according to the present invention which have a molecular weight of up to 2,000,000 (cf. page 7, 1<sup>st</sup> paragraph). The reference does not mention any specific cationic high IV polymers.

In addition, the flocculants are added to a biosolids containing aqueous stream which is quite different to a fermentation liquor comprising lignin and BOD according to the present application.

As discussed above, the process according to claim 1 is not rendered obvious by Brink alone or in combination with any other reference, especially combined with Minowa. As Moffett neither teaches nor suggests applying the flocculants to a fermentation liquor comprising lignin and BOD one skilled in the art would not consider this reference at all.

Hence, the subject-matter of claim 7 is not rendered obvious by Brink, Minowa and Moffett.

**Claim 18 is rejected under 35 USC 103(a) as being unpatentable over Brink 5,536,325 in view of Minowa and further in view of Chieffalo, US 5,975,439**

As already mentioned in the prior art of the present application Chieffalo et al. (US 5,975,439) relates to an automated process for producing ethanol shredding the cellulosic component of municipal solid waste and mixing this with equal amounts of concentrated sulphuric acid to provide a hydrolyzed mixture. At this stage, the solid by-product containing lignin is separated by filtration and the hydrolysate is subjected to fermentation (cf. col. 10, lines 49-53; col. 6, lines 40-49). Therefore, the fermentation liquor does not contain any lignin which may be separated and dewatered according to the present process.

In addition, there is neither a disclosure nor a suggestion to add flocculating agents, in particular cationic high IV polymers, to improve any involved solids-liquid separation process.

As discussed above, the process according to claim 1 is not rendered obvious by Brink alone or in combination with any other reference, especially combined with Minowa. Claim 18 is dependent from claim 1, the subject-matter of claim 18 is not rendered obvious by Brink, Minowa and Chieffalo.

As a conclusion, claim 1 and its dependent claims are novel and unobvious in view of the cited documents.

**Double Patenting Rejections**

Applicants respectfully request that they be allowed to delay the submittal of terminal disclaimers in light of the claims of 10/587,582 and 10/587,583 until the other rejections have been resolved. At that time, both the Office and applicants will know the scope of the actual claims to be granted.

Reconsideration and withdrawal of the rejection of claims 1-19 is respectfully solicited in light of the remarks and amendments *supra*.

Since there are no other grounds of objection or rejection, passage of this application to issue with claims 1-19 is earnestly solicited.

Applicants submit that the present application is in condition for allowance. In the event that minor amendments will further prosecution, Applicants request that the examiner contact the undersigned representative.

Respectfully submitted,



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